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Examining the Role Between Social Antecedents and Depression among LGBTQ+ Older Adults Eligible for Low-Income Housing

Jalal Uddin [1, †], Meredith Greene [2], Leslie Dubbin [3], Madeline Deutsch [4], Jason D. Flatt [1, †, *]

1. Department of Social and Behavioral Health, School of Public Health, University of Nevada, Las Vegas, Las Vegas, NV, US; E-Mails: jalal.uddin@unlv.edu; jason.flatt@unlv.edu
2. Division of Geriatrics, Department of Medicine, School of Medicine, University of California, San Francisco, San Francisco, CA, US; E-Mail: greenesteck@gmail.com
3. Department of Social & Behavioral Sciences, School of Nursing, University of California, San Francisco, San Francisco, CA, US; E-Mail: leslie.dubbin@ucsf.edu
4. Department of Family and Community Medicine, School of Medicine, University of California, San Francisco, San Francisco, CA, US; E-Mail: madeline.deutsch@ucsf.edu

† These authors contributed equally to this work.

* **Correspondence:** Jason D. Flatt; E-Mail: jason.flatt@unlv.edu

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Abstract

Housing is one of the top four most needed services for LGBTQ+ older adults, and this study focuses on the intersection of depression and social antecedents among LGBTQ+ older adults eligible for low-income housing. To explore social antecedents (i.e., demographics, early events, later events, social integration, and stressors) associated with screening positive for depression among low-income LGBTQ+ older adults from two cities in the Western United States. A cross-sectional study was conducted with LGBTQ+ older adults (n = 241). A two-item version of the Patient Health Questionnaire (PHQ-2) was used to screen for depression. Hierarchical logistic regression tested associations between screening positive for depression

and social antecedents. The average age of participants was 68 years and 92.5% identified as LGBTQ+. Over 24% (n = 58) screened positive for depression (PHQ-2 ≥ 3). Bivariate analyses found associations between screening positive for depression and several social antecedents, including demographics, later events, social integration, and stressors. Hierarchical logistic regression models found that LGBTQ+ older adults earning $30,000 or less were nearly five times more likely to screen positive depression than those earning more (OR = 4.57, 95% CI = 1.53-13.66, p = 0.006). Additionally, stressors such as problems with memory (OR = 4.05, 95% CI = 1.66-9.85, p = 0.002) and poor/fair quality of life (OR = 5.44, 95% CI = 2.24-13.20, p < 0.001) were associated with a 4-to-5 times higher odds of screening positive for depression compared with those who did not have these stressors. These findings reveal patterns of associations between social antecedents and depression among LGBTQ+ older adults eligible for low-income housing. This emphasizes the need for future research on the impact of housing and related structural interventions to promote the mental health of diverse aging populations.

Keywords
Depression; low-income; LGBTQ+; sexual minorities; housing; older adults

1. Introduction

The term sexual and gender minority (SGM) refers to persons who identify as gay, lesbian, bisexual (sexual minorities), and transgender and nonbinary, as well as individuals with gender identities, gender expressions, or reproductive developments varying from customary, societal, cultural, or biological norms (gender minorities) [1]. People who self-identify as transgender or gender nonbinary are those who see their gender identity and/or expression as being different from societal expectations of gender identity and/or expression based on the sex assigned to a person at birth, whereas people who define themselves as cisgender have a gender identity and/or expression that corresponds with the sex assigned to them at birth [2, 3]. Based on population-based surveys, approximately 3.5% of adults in the United States (U.S.) identify as lesbian, gay, or bisexual (LGB), while 0.3% identify as transgender. These figures indicate that approximately 9 million individuals in the country identify as LGBTQ+ [4].

LGBTQIA+ older adults face pronounced health disparities, reporting higher rates of disability, poor physical and mental health, and increased loneliness compared to their heterosexual cisgender counterparts. While they express critical needs for housing, transportation, and social support, tailored services for LGBTQIA+ older adults remain limited [5]. Challenges in obtaining affordable, welcoming, and supportive long-term housing exacerbate their health and aging concerns. Discrimination, financial hardship, and a lack of affordable or subsidized housing contribute to these challenges [6, 7]. Studies suggest that LGBTQIA+ older adults may need inclusive and supportive housing earlier than their counterparts due to fears of discrimination in long-term care settings [8-10]. Housing instability is heightened among those living alone with lower incomes and education attainment [7]. Despite facing significant health conditions, including chronic illnesses and mental health distress, potential resilience factors such as community connections and unique social

networks may play a crucial role for LGBTQIA+ older adults [7]. Recognizing the links between housing and health status, interventions and improvements at both individual and community levels are crucial. However, limited data exist on the relationship between housing and health for LGBTQIA+ older adults, emphasizing the need for further research on the experiences of those residing in inclusive, affordable, and supportive long-term housing environments to understand their impact on health and well-being [11]. Thus, it is important to understand social and environmental factors linked with the mental health of LGBTQ+ older adults, especially the higher rates of mental health problems and depression.

Housing instability can be defined as the condition where individuals or households experience challenges in maintaining a stable and secure residence. Housing instability encompasses various factors that disrupt the ability to remain in one's home willingly and free from harassment or dispossession [12]. Housing instability is also linked with stress, and influences physical and mental health outcomes. Rooted in stress process models, life events like eviction, financial strain, or housing instability challenge individuals' equilibrium, necessitating a period of readjustment [13]. Chronic strain, exemplified by persistent housing insecurity, when combined with life events, converge to heighten stress levels, creating a nuanced interplay with health outcomes. This comprehensive framework recognizes housing stress' impact across diverse life domains, targeting both individuals and communities, while acknowledging its potential to evoke harmful emotional responses [14]. Understanding the intricate relationship between housing instability and mental health is crucial for devising effective interventions and policies.

A study involving 8,415 respondents reveals that individuals grappling with housing insecurity are twice as likely to report poor or fair health, experience 14 or more days of poor mental health, and face limitations in daily activities due to health issues [15]. Additionally, those with housing insecurity exhibit a higher prevalence of unhealthy behaviors, including an increased likelihood of smoking and a nearly six-fold higher chance of delaying doctor visits due to financial constraints. These associations persist even after adjusting for socioeconomic and demographic factors [15]. Housing insecurity was also associated with poorer self-rated physical health, and reporting greater chronic conditions [16]. Another study found those experiencing housing insecurity related factors reported worse mental health scores and increased stress levels [17]. These findings underscore the critical role of housing stability as a social determinant of health, and link housing insecurity to poor mental health and related outcomes.

We will utilize George's (1989) Social Antecedent Model of Depression as our framework [18] to understand factors linked with depression of low-income LGBTQ+ older adults. The primary emphasis of this study was on depression, considering its prevalence and potential for treatment among older LGBTQ+ adults in low-income housing environments. George (1989) proposed a comprehensive theory on the social antecedents of depression in older adults [18, 19]. The theory incorporates various demographic and social factors across six distinct stages over an individual's lifetime. Each stage is proposed to represent a set of risk factors for depression or related mental health outcomes [18]. The first stage focuses on demographic factors (e.g., age and race/ethnicity), while the second and third stages examine early (e.g., education) and later (e.g., marital status) achievements and events. The fourth stage assesses social integration, is a measure of how connected an individual is to their social environment and can be represented in terms of their feelings of connection to others in their community [19]. factors such as community engagement, religious involvement, and neighborhood stability. In the fifth stage, vulnerability or stressors and

protective factors are considered, where protective factors encompass various forms of social integration, while stressors include chronic diseases and comorbidities, financial strain, and caregiving responsibilities. The sixth and most proximate stage in the model involves provoking agents and coping efforts, such as major life events and coping styles [20]. The application of this framework enables a comprehensive investigation into the various factors related to mental health in late life, including demographic, social, medical, and behavioral correlates. Previous studies utilizing this framework have predominantly examined factors associated with depression [19, 21].

In the context of older adults eligible for low-income housing, multiple factors associated with late-life mental health align with different stages of the Social Antecedent Model. These stages include demographic variables (age, sex, and race/ethnicity), early events and achievements (education and childhood traumas), later events and achievements (occupation, income, and marital status during adulthood), current social integration (religious affiliation, volunteering, and neighborhood stability), stressors and protective factors (chronic stressors and social support), and provoking agents and coping efforts (life events, coping styles, and strategies) [21]. The Social Antecedent Model has also been applied to diverse racial/ethnic groups, but there has been no research to determine its applicability to LGBTQ+ older adults. It is anticipated that distinct patterns of association may exist among specific factors for LGBTQ+ older adults and implications for depression.

Low-income housing options are designed to facilitate aging in place, serving as a bridge between independent living in traditional homes and long-term institutional care [22]. From a policy perspective, it is essential to recognize the increasing number of lower-income older adults who need to secure and sustain affordable and stable housing that can be adapted to their changing aging health needs [23]. The population of older LGBTQ+ households in the U.S., over 2 million, is characterized by significant diversity in terms of living arrangements, financial capabilities, health conditions, and life stages [4]. As a result, their housing needs and preferences vary, necessitating a range of housing options. However, there is a scarcity of affordable and accessible housing that offer LGBTQ+ welcoming communities and connect older adults to necessary health services and supports [24].

The main goal of this exploratory study was to improve our understanding of social-related factors associated with depression among older LGBTQ+ adults eligible for low-income housing, which for our large metropolitan cities in the Western U.S. (San Francisco and Los Angeles) was defined as one person earning less than 50% Area Median Income. Additionally, we explored differences based on race/ethnicity and gender identity. Then we investigated the social antecedents associated with screening positive for depression, specifically examining factors that may be important for developing and tailoring affordable and welcoming housing for LGBTQ+ older adults. Recognizing that housing is a significant social determinant of health, this research aims to shed light on its importance for public health and addressing the health of diverse aging populations, particularly within the LGBTQ+ community.

2. Materials and Methods

2.1 Participants

This cross-sectional study explored social antecedents associated with depression among low-income LGBTQ+ older adults (n = 241) from two metropolitan cities in the Western U.S. Participants

were recruited during a housing lottery for LGBTQ+ welcoming housing at two non-profit organizations in the respective cities. Inclusion criteria for this study encompassed individuals who self-identify as LGBTQ+, were aged 62 or older or living with an adult aged 62 and older, and demonstrated sufficient fluency in English to complete the survey. To be eligible for the study, participants had to be aged 50 or older. Prior to survey administration, participants were required to provide informed consent. The survey itself was a one-time, self-administered questionnaire, completed in-person, and typically took participants between 45 to 60 minutes to complete. Participants who completed the survey were entered into a drawing for a $50 gift card. Ethical approval for this study was obtained from the Institutional Review Boards at the University of California, San Francisco, and the University of Nevada, Las Vegas.

2.2 Measures

Study measures included demographic characteristics: age (including age groups: <55, 56-65, 66-75, >75); U.S. birth status (Yes, No); Race (White, Black, American Indian, Asian, Multi Race; Ethnicity was Hispanic/Latino; and based on the smaller sample size, we then created two categories: person of color vs. white); sex assigned at birth included options of male or female; gender identity options included selecting all that apply from the following options: man, woman, transgender woman, transgender man, genderqueer/gender non-binary, another gender; sexual orientation included selecting all identities that apply from the following options: asexual, bisexual, gay, lesbian, queer, questioning, straight, another identity. For gender identity and sexual orientation, participants could select more than one option.

For early events and achievements, available study measures included: education level (no schooling, nursery school to high school, no diploma, high school graduate or equivalent (e.g., GED), trade/technical/vocational training, some college, 2-year college degree, 4-year college degree, master's degree, doctoral degree, and professional degree (e.g., M.D., J.D., M.B.A). For later events and achievements, income ($0-5,000, $5,001-10,000, $10,001-15,000, $15,001-20,000, $20,001-30,000, $30,001-40,000, $40,001-50,000, $50,001-60,000, $60,001-70,000, $80,001-90,000, $90,001-100,000, $100,001+). Current housing status (single family home, condo/townhome, apartment, senior independent living apartment, group home or assisted living facility, nursing home, shelter or dormitory, homeless, and another); and current housing satisfaction (happy vs. unhappy).

In terms of social integration, participants were asked three questions: “How often do you feel isolated from your racial/ethnic or cultural community?”; “How often do you feel isolated from other LGBT people?”; and “How often do you feel isolated from your spiritual community?”, with response options including a lot, sometimes, seldom, or never.

Stressors include self-reported past diagnosis of physical health conditions (high blood pressure, heart attack, osteoporosis, angina or coronary heart disease, stroke, arthritis, asthma, cancer, kidney disease, diabetes, chronic obstructive pulmonary disease (COPD), emphysema, chronic bronchitis, and HIV/AIDS) [25]. We also assessed self-reported problems with memory and balance or walking (option: yes or no) [26]. Additionally, physical comorbidities index was created by totaling the number of physical health conditions and calculating the mean, standard deviation (SD), and range. In terms of mental health conditions, participants self-reported about previous diagnoses depressive disorders, anxiety disorders, and post-traumatic stress disorder (PTSD). The study also

utilized the two-item version of the Patient Health Questionnaire (PHQ-2) to screen for depression [25]. The PHQ-2 consists of the first two items from the PHQ-9. The introductory question asks, "Over the last two weeks, how often have you been bothered by any of the following problems?" The two items specifically inquire about "little interest or pleasure in doing things" and "feeling down, depressed, or hopeless." Response options included "not at all," "several days," "more than half the days," and "nearly every day," which were scored as 0, 1, 2, and 3, respectively. The PHQ-2 total score can range from 0 to 6 [27]. A cutoff point of ≥3 (out of a possible score of 6) was considered for screening positive for depression [20], and participants were categorized into two groups: "No depression" (scores < 3) and "depression" (scores ≥ 3).

2.3 Statistical Analyses

Descriptive statistics were used to summarize all variables examined. Prior to multivariable analyses, bivariate analyses using Chi-square or t tests were used to examine associations between demographic, early events, later events, social integration and stressors and screening positive for depression. To test the different factors of the Social Antecedent Model associated with screening positive for depression, we used hierarchical logistic regression models. The hierarchical logistic regression models included model 1: demographic variables, model 2: model 1 plus later events, model 3: model 2 plus social integration, and model 4: model 3 plus Stressors (health-related outcomes) with the outcome being screening positive for depression (dependent variable). All variables entered into the regression models were treated as categorical, with the exception of age and comorbidities. Only variables that were significantly associated with screening positive for depression ($p < 0.05$) in the bivariate analyses were tested in the hierarchical regression models. However, all models were adjusted for age and race/ethnicity (person of color vs. white). All analyses were conducted using SPSS (Statistical Package for Social Sciences) version 28.0.

3. Results

3.1 Demographic Characteristics

The study had a total of 241 LGBTQ+ older adults (Table 1), with a mean age of 68.05 years (SD = 6.0). Most of the participants (56%, n = 135) were in the age group of 66-75 years. Nearly a third (32%; n = 77) of participants fell between the age group of 56-65 years. The majority of respondents, 87.1% (n = 210), were born in the U.S. In terms of race, 64.7% (n = 156) identified as White, 10% Black (n = 24), 1% American Indian (n = 3), 4% Asian (n = 10), 10% Multiracial (n = 23), and 10% as Hispanic/Latino (n = 23). In terms of sex assigned at birth, 73% (n = 177) were identified as male, and 26% (n = 62) were female. When considering gender identity, 67% (n = 161) identified as male, 22% (n = 54) female, 3% (n = 8) transgender female, 2% (n = 4) genderqueer/non-binary, and 0.8% (n = 2) another gender identity. In terms of sexual orientation, 54% (n = 131) identified as gay, 12% (n = 28) lesbian, 10% (n = 25) bisexual, 3% asexual (n = 7), 4% queer (n = 9), 2% questioning (n = 4), 8% heterosexual/straight (n = 19), and 5% another sexual orientation (n = 11). Over 90% of older adults in this study identified as LGBTQ+ (n = 223; 92.5%), with others identifying as straight/heterosexual being roommates of an LGBTQ+ older adult.

Table 1 Descriptive characteristics for social antecedent factors for LGBTQ+ older adults.

Variables	n (%)
Demographics	
Age, Mean, (SD)	68.1, (6.0)
Age Group	
<55	5 (2.1)
56-65	77 (32.0)
66-75	135 (56.0)
>75	22 (9.1)
Born in the United States	
Yes	210 (87.1)
No	29 (12.0)
Race	
White	156 (64.7)
Black	24 (10.0)
American Indian	3 (1.2)
Asian	10 (4.1)
Multi Race	23 (9.5)
Hispanic/Latino	23 (9.5)
Sex assigned at birth	
Male	177 (73.4)
Female	62 (25.7)
Current gender identity	
Male	161 (66.8)
Female	54 (22.4)
Trans female	8 (3.3)
Genderqueer	4 (1.7)
Another gender	2 (0.8)
Current sexual orientation	
Asexual	7 (2.9)
Bisexual	25 (10.4)
Gay	131 (54.4)
Lesbian	28 (11.6)
Queer	9 (3.7)
Questioning	4 (1.7)
Straight	19 (7.9)
Another	11 (4.6)
Early Events	
Education	
No schooling	1 (0.4)
Nursery school to high school, no diploma	5 (2.1)
High school graduate or equivalent (e.g. GED)	21 (8.7)
Trade/Technical/Vocational training	6 (2.5)

Some college	70 (29.0)
2-year college degree	26 (10.8)
4-year college degree	69 (28.6)
Master's degree	31 (12.9)
Doctoral degree	6 (2.5)
Professional degree (e.g., M.D., J.D., M.B.A)	6 (2.5)
Later Events	
Combined annual income	
$0-5,000	10 (4.1)
$5,001-10,000	8 (3.3)
$10,001-15,000	45 (18.7)
$15,001-20,000	36 (14.9)
$20,001-30,000	72 (29.9)
$30,001-40,000	30 (12.4)
$40,001-50,000	18 (7.5)
$50,001-60,000	8 (3.3)
$60,001-70,000	4 (1.7)
$80,001-90,000	2 (0.8)
$90,001-100,000	3 (1.2)
$100,001+	1 (0.4)
Current Housing Status	
Single family home	20 (8.3)
Condo/townhome	14 (5.8)
Apartment	133 (55.2)
Senior independent living apartment	13 (5.4)
Group home or assisted living facility	3 (1.2)
Nursing home	1 (0.4)
Shelter or dormitory	5 (2.1)
Homeless	13 (5.4)
Another	39 (16.2)
Current housing satisfaction	
Happy	78 (32.4)
Unhappy	162 (67.2)
Social Integration	
Feel isolated from your racial/ethnic or cultural community	
A lot	32 (13.3)
Sometimes	67 (27.8)
Seldom	49 (20.3)
Never	92 (38.2)
Feel isolated from other LGBT people	
A lot	48 (19.9)
Sometimes	67 (27.8)
Seldom	48 (19.9)

Never	75 (31.1)
Feel isolated from your spiritual community	
A lot	30 (12.4)
Sometimes	53 (22.0)
Seldom	43 (17.8)
Never	113 (46.9)
Stressors	
Physical Health Conditions	
High blood pressure	114 (47.3)
Heart attack (or myocardial infarction)	16 (6.6)
Osteoporosis	35 (14.5)
Angina or coronary heart disease	15 (6.2)
Stroke	15 (6.2)
Arthritis, rheumatoid arthritis, gout, lupus or fibromyalgia	85 (35.3)
Asthma	32 (13.3)
Cancer (any type)	51 (21.2)
Kidney disease (not including kidney stones, bladder infection or incontinence)	13 (5.4)
Diabetes	33 (13.7)
Chronic Obstructive Pulmonary Disease, emphysema or chronic bronchitis	21 (8.7)
HIV/AIDS	65 (27.0)
Physical comorbidities, Mean (SD, range)	2.00 (1.42, 0-5)
Mental Health Conditions	
Depressive disorder, including depression, major depression, dysthymia, or minor depression	101 (41.9)
Anxiety or an anxiety disorder	71 (29.5)
Post-traumatic stress disorder	45 (18.7)
PHQ-2 (mean, SD)	(1.7, 1.72)
No Depression (<3)	183 (75.9)
Depression (≥3)	58 (24.1)
Current smoking status	
Yes	33 (13.7)
No	202 (83.8)
Problems with your memory	
Yes	81 (33.6)
No	152 (63.1)
Problems with balance or walking	
Yes	106 (44.0)
No	127 (52.7)
Self-rated quality of life	
Poor	20 (8.3)

Fair	49 (20.3)
Good	96 (39.8)
Very Good	57 (23.7)
Excellent	17 (7.1)

Note: SD = standard deviation, GED = general education equivalent, PHQ-2 = Patient Health Questionnaire 2.

3.2 Early Events

Participants reported their educational background on a 10-point educational level scale. Where 29.0% reported they completed a college education, associate's degree or higher (n = 70), and less than 9% completed a high school graduate or general education equivalent (GED).

3.3 Later Events

In regards to income, over 70% (n = 171) of participants reported earning $30,000 or less annually. When considering housing status, 55% lived in an apartment (n = 133), 8% single-family home (n = 20), 6% condo/townhome (n = 14), 5% senior independent living apartment (n = 13), and 16% reported living in other housing types (n = 39). In terms of current housing satisfaction, 33% reported being happy with their current housing (n = 78), while 67% reported being unhappy (n = 162).

3.4 Social Integration

In terms of connections with racial/ethnic or cultural community, 13% reported feeling isolated a lot (n = 32), 28% reported feeling isolated sometimes (n = 67), 20% seldomly felt isolated (n = 49), and nearly 38% (n = 92) reported never feeling isolated from their racial/ethnic or cultural community. When considering feeling isolated from other LGBTQ+ people, 20% reported feeling isolated a lot (n = 48), 28% feeling isolated sometimes (n = 67), 20% isolated seldom (n = 48), and 31% never feeling isolated from other LGBTQ+ individuals (n = 75). In terms of connections to the spiritual community, 12% of the participants claimed feeling isolated a lot (n = 30), 22% isolated sometimes (n = 53), 18% felt isolated seldom (n = 43), and 47% said they never feeling isolated from their spiritual community (n = 113).

3.5 Stressors

In terms of physical health conditions, nearly half (47%) reported high blood pressure (n = 114). 35% reported arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia (n = 85), 27% HIV/AIDS (n = 65), and 21% cancer (n = 51). For comorbidities, participants had an average of two physical health conditions. In regards to mental health conditions, 42% of participants said they had a depressive disorder diagnosis (n = 101), while 30% reported a diagnosis of anxiety or an anxiety disorder (n = 71). For the PHQ-2, the mean score was 1.7 (SD = 1.72). Using validated cut-points for screening positive for depression, 24.1% (n = 58) screened positive for depression (score ≥ 3).

3.6 Bivariate Analyses Between Social Antecedents and Screening Positive for Depression

Table 2 represents the bivariate associations between screening positive for depression and social antecedents among low-income LGBTQ+ older adults. Age was found to be significantly associated with screening positive for depression (p = 0.02), with those with younger age were more likely to have a positive screen for depression (66.4 vs. 68.6) compared to those without depression. The analysis revealed a significant association between race/ethnicity and depression (p = 0.05). For race/ethnicity, White participants were more likely to screen positive for depression (75.9% vs. 24.1%, p = 0.05) compared with Persons of Color. Combined annual income was associated with depression, with participants screening positive for depression being more likely to have a combined annual income of $20,000 or less. There was also a significant association between housing satisfaction and depression, with the majority of individuals screening positive for depression reporting being unhappy with their current housing (79.3% vs. 20.7%, p = 0.03) compared with those who reported being happy. Feeling isolated from racial/ethnic or cultural communities, other LGBT people, and spiritual communities were also associated with screening positive for depression (all p < 0.001). For stressors, experiencing physical comorbidities and smoking were also associated with screening positive for depression. Additionally, participants with memory problems, balance or walking problems, and poor self-rated quality of life were also more likely to screen positive for depression (all p < 0.001).

Table 2 Bivariate associations between screening positive for depression and social antecedents among low-income LGBTQ+ older adults (N = 241).

Variables	No Depression n (%) N = 183 (75.9)	Depression n (%) N = 58 (24.1)	p-value
Demographics			
Age, Mean (SD)	68.6 (5.8)	66.4 (6.5)	0.016
Born in the United States			
Yes	157 (85.8)	53 (94.6)	0.08
No	26 (14.2)	3 (5.4)	
Race/Ethnicity			
White	112 (61.9)	44 (75.9)	0.05
Person of color	69 (38.1)	14 (24.1)	
Sex assigned at birth			
Male	131 (72.0)	46 (80.7)	0.2
Female	51 (28.0)	11 (19.3)	
Current Gender Identity			
Male	118 (64.5)	43 (74.1)	
Female	45 (24.6)	10 (17.2)	0.39
Transgender/nonbinary	20 (10.9)	5 (8.6)	
Early Events			
Education			
Under College Degree	95 (51.9)	34 (58.6)	0.38

College degree	88 (48.1)	24 (41.4)	
Later Events			
Combined annual income			
$20,000 or less	69 (38.5)	30 (51.7)	
$20,001-30,000	51 (28.5)	21 (36.2)	0.008
≥$30,001	59 (33.0)	7 (12.1)	
Current Housing Status			
Apartment	105 (57.4)	28 (48.3)	
Home	26 (14.2)	8 (13.8)	
Care type facility	12 (6.6)	5 (8.6)	0.71
Shelter/Homeless	12 (6.6)	6 (10.3)	
Another	28 (15.3)	11 (19.0)	
Current housing satisfaction			
Happy	66 (36.3)	12 (20.7)	0.03
Unhappy	116 (63.7)	46 (79.3)	
Social Integration			
Feel isolated from your racial/ethnic or cultural community			
A lot	16 (8.7)	16 (28.1)	<0.001
Sometimes/Never	167 (91.3)	41 (71.9)	
Feel isolated from other LGBT people			
A lot	22 (12.2)	26 (45.6)	<0.001
Sometimes/Never	159 (87.8)	31 (54.4)	
Feel isolated from your spiritual community			
A lot	14 (7.70	16 (28.1)	<0.001
Sometimes/Never	168 (92.3)	41 (71.9)	
Stressors			
Physical comorbidities, Mean (SD)	1.8 (1.3)	2.5 (1.5)	0.002
Other Health and Social Factors			
Current smoker	18 (10.1)	15 (26.8)	0.002
Problems with memory	46 (26.0)	35 (62.5)	<0.001
Problems with balance or walking	69 (39.0)	37 (66.1)	<0.001
Self-rated quality of life			
Poor/Fair	37 (66.1)	69 (28.9)	<0.001
Good	151 (82.5)	19 (33.9)	

3.7 Associations Between Depression and Social Antecedents

Table 3 presents the results of a hierarchical logistic regression model examining the social antecedents associated with screening positive for depression among low-income LGBTQ+ older adults. In Model 1, increasing age was associated with a 6% decreased odds of screening positive for depression (OR = 0.94, 95% CI = 0.89-0.99, p = 0.03). Additionally, identifying as a person of color was associated with a lower rate of screening positive for depression compared to persons of color (OR = 0.45, 95% CI = 0.22-0.94, p = 0.03). With the inclusion of the later events in Model 2, associations remained similar for age (OR = 0.94, 95% CI = 0.88-0.98, p = 0.01) and race/ethnicity

(OR = 0.37, 95% CI = 0.17-0.79, p = 0.006) and lower incomes were associated with a five times higher odds of screening positive for depression. When Social Integration was added to Model 3, age remained significant (OR = 0.95, 95% CI = 0.90-1.00, p = 0.083), and identifying as a person of color was associated with a 58% decreased odds of screening positive for depression (OR = 0.42, 95% CI = 0.19-0.99, p = 0.035). Low-income participants (less than $20,000) were over 5 times more likely than those earning more than $30,000 (OR = 5.26, 95% CI = 1.85-14.99, p = 0.002) to screen positive for depression. After the addition of Stressors to Model 4, the association between age (OR = 0.96, 95% CI = 0.90-1.03, p = 0.24), identifying as a person of color (OR = 0.40, 95% CI = 0.15-1.09, p = 0.072) were attenuated. Individuals earning less than $20,000 were 4.5 times more likely to screen positive depression than those earning more than $30,000 (OR = 4.57, 95% CI = 1.53-13.66, p = 0.006). Problems with memory (OR = 4.05, 95% CI = 1.66-9.85, p = 0.002) and Poor/Fair Quality of Life (OR = 5.44, 95% CI = 2.24-13.20 p < 0.001) were associated with a 4-to-5 times higher odds of screening positive for depression.

Table 3 Hierarchical logistic regression model exploring social antecedent factors associated with depression among low-income LGBTQ+ older adults.

Characteristics	**Model 1**			**Model 2**			**Model 3**			**Model 4**		
	OR	95% CI	P Value	OR	95% CI	P Value	OR	95% CI	P Value	OR	95% CI	P Value
Demographics												
Age	0.94	0.89, 0.99	0.03	0.94	0.88, 0.98	0.01	0.95	0.90, 1.01	0.083	0.96	0.90, 1.03	0.24
Person of color	0.45	0.22, 0.94	0.03	0.37	0.17, 0.79	0.006	0.42	0.19, 0.99	0.035	0.40	0.15, 1.09	0.072
Later Events												
Combined annual income												
$20,000 or less				5.26	1.85, 14.99	0.002	4.57	1.53, 13.66	0.006	1.85	0.514, 6.66	0.26
$20,001-30,000				5.15	1.75, 15.16	0.003	4.59	1.47, 14.28	0.01	3.22	0.88, 11.78	0.35
≥$30,001					Ref			Ref			Ref	
Current housing satisfaction (Unhappy)				1.67	0.78, 3.59	0.19	1.46	0.65, 3.28	0.36	1.19	0.46, 3.10	0.71
Social Integration												
Feel isolated from racial/ethnic or cultural community							1.01	0.32, 3.14	0.97	0.72	0.18, 2.96	0.65
Feel isolated from other LGBT people							2.92	1.12, 7.63	0.029	1.96	0.60, 6.44	0.27
Feel isolated from spiritual community							2.39	0.80, 7.09	0.18	3.26	0.83, 12.72	0.08
Stressors												
Physical Comorbidities										1.29	0.95, 1.74	0.10

Current smoking status	2.61	0.90, 7.53	0.077
Problems with memory	4.05	1.66, 9.85	0.002
Problems with balance or walking	1.57	0.62, 3.98	0.34
Poor/Fair Quality of Life	5.44	2.24, 13.20	<0.001

Notes: OR = odds ratio; CI = confidence interval. Model 1 accounts for demographic characteristics including age, identifying race as White; Model 2 accounts for Model 1+ later events; Model 3 accounts for model 2+ Social Integration; Model 4 accounts for model 3+ Stressor.

4. Discussion

The current study aimed to investigate social antecedents associated with screening positive for depression among low-income, older LGBTQ+ adults eligible for low-income housing living in two Western Cities in the U.S. Our study revealed that increasing age and identifying as a person of color were associated with a decreased odds of screening positive for depression. Income level was also associated, with participants earning less than $20,000 exhibiting a higher odds of screening positive for depression compared to those earning more than $30,000. Additionally, problems with memory and poor/fair quality of life were significantly associated with screening positive for depression. Uniquely, current housing satisfaction was not associated with screening positive for depression after accounting for demographics and later events. These findings emphasize the importance of identifying and addressing several social and health factors and providing targeted support to improve the mental well-being of low-income LGBTQ+ older adults.

Our findings align with previous research from Chinese older adults that has found a higher prevalence of depression among low-income older individuals aged 60 to 102 years [28]. Given that LGBTQ+ older adults in the U.S. are often low-income, there could be a greater vulnerability for depression in late life. Additionally, a population-based study in the U.S. revealed that 31% of LGBT older adults reported experiencing depression [23] compared with 24% screening positive with depression and 42% having a past diagnosis of depression in our study. These findings underscore the significance of addressing mental health concerns and eligibility for low-income housing older LGBTQ+ individuals, emphasizing the need for targeted interventions and support services tailored to their specific needs. Numerous social support interventions have been investigated, such as connecting older adults residing in public housing with a volunteer program to enhance their mental well-being and reduce depressive symptoms [29].

We also observed a significant association between age and screening positive for depression ($p = 0.02$). Specifically, individuals experiencing depression were nearly two years younger than those who did not screen positive for depression. These findings suggest that younger LGBTQ+ older adults may be more vulnerable to depressive symptoms, which is consistent with previous research indicating that late-life major depression is associated with younger age [29]. Furthermore, another study identified significant associations between age and depressive symptoms [28]. These findings highlight the importance of considering younger age as a potential risk factor for depression among LGBTQ+ older adults, and the need for targeted interventions to address mental health concerns among this growing aging population who may reside in low-income senior housing.

We also found that persons of color were less likely to screen positive for depression compared to White older adults. This highlights the importance of considering racial/ethnic differences and mental health outcomes among LGBTQ+ older adults. A study observed significant variations in depression diagnoses across different gender and racial/ethnic groups (e.g., women and men, and Latino and Black adults) [19]. Conversely, another study found that mostly White older gay and lesbian adults reported greater life satisfaction and fewer mental health problems [23]. These results emphasize the complex interplay of race/ethnicity, gender, age, and sexual orientation with mental health outcomes, warranting further research and tailored interventions to address potential mental health disparities among diverse LGBTQ+ aging populations.

Regarding early events from the Social Antecedent Model, our study revealed no associations between education and screening positive for depression, which aligns with the findings from a

previous study [29]. However, a study conducted in Korea found a significant association between education and depression among individuals living in substandard housing [30], consistent with another study that found an association between education and depression among elderly individuals in rural China [28].

In relation to later events from the Social Antecedent Model, our study found an association between combined annual income and screening positive for depression. Moreover, participants earning $20,000 or less were more likely to screen positive for depression. These findings align with previous studies where personal annual income was found to be a potential risk factor for depression, with older participants reporting the lowest personal annual income (≤$10,000) being 1.6 times more likely to have depression than participants with the highest personal annual income (≥$20,000) [28]. Another study indicated that individuals with lower incomes tended to have higher depression scores [19].

Our study found no significant association ($p = 0.71$) between current housing status and depression, which was similar to a previous study that found no significant differences in housing conditions among different depressive symptoms [31]. However, this may be due to variation in housing status and lack of power to examine differences. A study conducted in the UK found that individuals residing in substandard housing reported higher levels of depression compared to those in standard or above housing [32]. Notably, the majority (79.3%) of participants screening positive for depression in our study expressed unhappiness with their housing. These findings underscore the importance of housing satisfaction and mental well-being. Previous research has highlighted a link between housing stability, access to healthcare, and improved mental health outcomes [30]. Further research is necessary to comprehend the relationship between housing satisfaction and depression, as well as potential relationships between different housing types and memory problems and subsequent cognitive decline and dementia risk.

Examining various housing assistance programs, research indicates that individuals currently residing in public housing experience lower likelihoods of poor health and psychological distress, such as depression, compared to those expecting future public housing residency [33]. Additionally, receiving housing assistance, particularly through public housing and multifamily housing, is associated with improved health for low-income adults [34]. These findings carry important policy implications, suggesting that public housing, in particular, may serve as a catalyst for improved mental health outcomes and potentially reducing depressive symptoms. Policymakers should consider these nuanced outcomes when designing and evaluating housing assistance initiatives, recognizing the diverse impacts on adult well-being. Furthermore, addressing limited access to affordable housing, especially for those awaiting assistance, could be crucial for mitigating depression among LGBTQ+ older adults. Investments in rental assistance are recommended to improve population well-being, underscoring the detrimental impact of prolonged wait times on mental health outcomes [35].

In terms of social integration, individuals who experienced feelings of isolation from their racial/ethnic or cultural community, other LGBTQ+ individuals, and their spiritual community were more likely to screen positive for depression. This may highlight the importance of social support and a sense of belonging in promoting mental well-being of low-income LGBTQ+ older adults. This also aligns with previous research demonstrating that lower levels of social support are associated with more severe depressive symptoms among older adults in public housing [29]. Furthermore, studies have indicated that older gay men may experience depression and unmet emotional needs,

while good mental health is linked to higher self-esteem, social integration, and awareness of one's sexual orientation [23]. Additionally, past findings suggest that a positive sense of community belonging and engagement in religious or spiritual activities contribute to the well-being of LGBTQ+ individuals [28]. Notably, a longitudinal study on housing for older LGBTQ+ individuals highlighted the importance of stability, community, social support, and in-house services for their overall health [30]. These findings are consistent with previous research emphasizing the crucial role of social support and community in the psychological well-being of older LGBTQ+ individuals [23].

Our findings revealed various stressors associated with screening positive for depression in older LGBTQ+ adults. Notably, physical health conditions, including physical comorbidities, were significantly associated with depression, highlighting the influence of physical well-being on mental health. Additionally, factors such as current smoking status, memory problems, balance or walking issues, and poor/fair quality of life were associated with screening positive for depression. These results underscore the importance of comprehensive care that addresses both physical and mental health concerns of LGBTQ+ older adults. Consistent with prior research, physical illnesses were linked to more severe depressive symptoms [29], and another study [31] found disability status and limitations in Activities of Daily Living were associated with greater depressive symptoms. Furthermore, medical comorbidities, mobility impairments and perceived social support have also been found to be associated with depression among older adults [29].

Contrary to our expectations, stressors such as physical comorbidities and balance or walking issues were not significantly associated with screening positive for depression. However, our results indicated that memory problems and poor/fair quality of life may be important risk factors to consider. Our final regression model also did not find any significant associations with combined annual income, which differs from a previous study where personal annual income was found to be significantly and independently associated with depression [31]. Similarly, our study found no significant association between depression and education or other housing types variables, aligning with the findings of the referenced study [31]. This may highlight that stressors may play an important role in the mental well-being of LGBTQ+ older adults compared with other social determinants, such as income and housing, but longitudinal research is needed to better understand these complex relationships and social antecedents.

4.1 Limitations

Several limitations should be acknowledged in the present study. First, the cross-sectional design restricts the ability to establish causal relationships and determine the temporal sequence of social antecedents examined in this study. Second, the use of a convenience sample may introduce selection bias and limit the generalizability of the findings to broader populations. Additionally, our small sample size limited our ability to examine the role of different types of housing situations and subgroup differences among the LGBTQ+ community (e.g., lesbians, gays, bisexual and transgender groups) and racial/ethnic groups. Reliance on the two-item version of the Patient Health Questionnaire (PHQ-2) to screen for depression, which may not capture the full spectrum of depressive symptoms and could potentially overlook mental health challenges in participants. Next, relying on self-report measures and perceptions of health-related outcomes for data collection may introduce the possibility of recall and social desirability biases. Fourth, the study utilized a limited set of measures, potentially overlooking other important variables that may contribute to

depression. The study did not assess household size or current health insurance status, which are indeed crucial factors in contextualizing the significance of reported income levels and access to healthcare. Moreover, acknowledging the variation in financial needs among individuals and households of different sizes is essential for a more accurate understanding of the economic status and potential disparities within the study population. Additionally, the absence of comparison groups and the failure to account for other potential confounding factors may restrict the interpretation of the findings. These limitations underscore the importance of future research efforts aimed at addressing these issues and providing a more comprehensive understanding of the causal and risk factors influencing depression among low-income LGBTQ+ older adults.

5. Conclusions

This study aimed to examine the applicability of George's (1989) Social Antecedent Model in understanding the correlates of screening positive for depression among low-income LGBTQ+ older adults eligible for low-income housing in two Western cities in the U.S. The findings underscore the significance of considering unique patterns of association within this specific population. The findings of this study shed light on the pressing need to better understand social factors, such as housing satisfaction, isolation, and quality of life, on depression and the mental health of low-income LGBTQ+ older adults. Additionally, the study highlights the importance of considering potential stressors, such as memory problems, that may be associated with the mental health of LGBTQ+ older adults eligible for low-income housing. These findings also provide important implications to consider when developing programs and support services that cater to the unique needs of low-income LGBTQ+ older adults, with the ultimate goal of promoting their mental well-being and overall quality of life. Future research and action are needed to address the challenges faced by this population and to ensure appropriate support is provided to enhance their mental health.

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Author Contributions

Conceptualization, J.U., M.G., and J.D.F.; methodology, J.U. and J.D.F.; data curation, J.D.F.; writing-original draft preparation, J.U.; writing-review and editing, J.U., M.G., L.D. and J.D.F.; funding acquisition, J.D.F. All authors have read and agreed to the published version of the manuscript.

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Competing Interests

The authors declare no competing interests.

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